

# Chapter 7: Assessment of the Kamchatka Flounder stock in the Bering Sea and Aleutian Islands

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## Executive Summary

Bering Sea and Aleutian Islands (BSAI) Kamchatka flounder is assessed biennially according to the stock assessment prioritization schedule. During odd years, an executive summary is presented with recommendations of harvest levels for the next two years for this species. The most recent full assessment was conducted in 2020, information regarding the stock assessment model and results is available online (Bryan et. al, 2020; <https://www.fisheries.noaa.gov/resource/data/2020-assessment-kamchatka-flounder-stock-bering-sea-and-aleutian-islands>). A full stock assessment document with updated assessment and projection model results is scheduled for November, 2022.

A forward projecting age structured model is the primary assessment tool for BSAI Kamchatka flounder, which qualifies as a tier 3 stock. The assessment model is not run during off-cycle years, but the projection model is updated with new catch information. This incorporates the most current catch information without re-estimating model parameters and biological reference points.

### Summary of changes in assessment input

*Changes in the input data:* Changes were not made to the assessment model inputs. New data added to the projection model included a final 2020 catch estimate and a preliminary catch estimates for 2021-2023. The 2020 catch input was reduced to 7,422 t from 7,427 t. The 2021 catch input used in the projection model was set equal to 6,770.09 t. The 2021 catch was estimated by expanding the catch as of October 8th by a factor of 1.0493. This expansion factor represents the average proportion of catch after October 8<sup>th</sup> between 2016 and 2020. The 2021 catch estimate was also used as the catch value for 2022 and 2023.

*Changes in the assessment methodology:* Changes were not made to the assessment model.

### Summary of Results

The recommended maximum ABC for 2022 from the updated projection model is 9,214 t. This is 2.6% higher than the 2021 ABC and less than 1% higher than the 2022 ABC projected from last year's assessment. The corresponding reference values for BSAI Kamchatka flounder are summarized in the table on the following page. Overfishing is not occurring, the stock is not overfished, and it is not approaching an overfished condition. Status is determined by comparing from the most recent complete year (2020) of official catch to the OFL and comparing the projected spawning biomass relative to  $B_{35\%}$ . The official Kamchatka flounder, total catch for 2020 (7,442 t) is less than the 2020 OFL (11,495 t) indicating overfishing is not occurring. Spawning biomass is projected to be above  $B_{35\%}$  for 2021-2023; hence, the stock is not overfished and it is not approaching an overfished condition.

Catch-biomass ratios were derived from the reported catch and total biomass estimated by the assessment model for 1991 through 2020. This ratio for 2021 was derived from the estimated catch in 2021 and the total biomass from the projection model. Kamchatka flounder were not distinguished from arrowtooth flounder prior to 2011. The catch estimates between 1991 and 2007 were assumed to be 10% of the total arrowtooth catch and this is associated with catch-biomass ratios that were stable at 0.01 (Table 7.1,

Figure 7.1). The catch-biomass ratio increased to 0.15 in 2010. It was assumed that Kamchatka flounder made up 34%, 42%, and 54% of the total arrowtooth catch in 2008, 2009, and 2010, respectively. The catch biomass ratio declined from 0.08 in 2011 to 0.02 in 2018 and increased to 0.05 in 2020.

Biomass estimates from the EBS shelf trawl survey, EBS slope trawl survey, and the AI trawl surveys are used in the assessment model. The EBS shelf trawl survey was conducted in 2021 and declined by 26% from 44,870 t in 2019 to 33,011 t in 2021 (Figure 7.2). The EBS slope survey and AI survey were not conducted in 2021.

<b>Quantity</b>	As estimated or <i>specified last</i> year for		As estimated or recommended this year for	
	2021	2022	2022	2023
<i>M</i> (natural mortality rate)	0.11	0.11	0.11	0.11
Tier	3	3	3	3
Projected total (age 2+) biomass (t)	144,671	143,248	143,983	142,762
Projected female spawning biomass	54,341	55,256	55,701	57,082
Projected				
<i>B</i> <sub>100%</sub>	101,376	101,376	101,376	101,376
<i>B</i> <sub>40%</sub>	40,550	40,550	40,550	40,550
<i>B</i> <sub>35%</sub>	35,482	35,482	35,482	35,482
<i>F</i> <sub>OFL</sub>	0.108	0.108	0.108	0.108
<i>maxF</i> <sub>ABC</sub>	0.090	0.090	0.090	0.090
<i>F</i> <sub>ABC</sub>	0.090	0.090	0.090	0.090
OFL (t)	10,630	10,843	10,903	11,115
maxABC (t)	8,982	9,163	9,214	9,393
ABC (t)	8,982	9,163	9,214	9,393
<b>Status</b>	As determined <i>last</i> year for:		As determined <i>this</i> year for:	
	2019	2020	2020	2021
Overfishing	No	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

\*Projections are based on the final catch of 7,442 t in 2020 and estimated catch of 6,770.09 t in 2021-2023.

#### Summary for Plan Team

<b>Species</b>	<b>Year</b>	<b>Biomass<sup>1</sup></b>	<b>OFL</b>	<b>ABC</b>	<b>TAC</b>	<b>Catch<sup>2</sup></b>
Kamchatka flounder	2019	142,176	10,965	9,260	5,000	4,534
	2020	145,368	11,495	9,708	6,800	7,442
	2021	-	10,630	8,982	8,982	6,455
	2022	-	10,903	9,214	-	-
	2023	-	11,115	9,393	-	-

<sup>1</sup>Total biomass (age 2+) from the age-structured model.

<sup>2</sup>Current as of October 8, 2021. Source: NMFS Alaska Regional Office Catch Accounting System via the AKFIN database (<http://www.akfin.org>).

#### Responses to SSC and Plan Team Comments on Assessments in General

“The SSC requests that all authors fill out the risk table in 2019...” (SSC December 2018)

*“...risk tables only need to be produced for groundfish assessments that are in ‘full’ year in the cycle.” (SSC, June 2019)*

*“The SSC recommends the authors complete the risk table and note important concerns or issues associated with completing the table.” (SSC, October 2019)*

A risk table will be provided during the next full assessment cycle in 2020.

## **Responses to SSC and Plan Team Comments Specific to this Assessment**

*The SSC supports the PT recommendations that the age-length transition matrix be re-examined in the next full assessment and a re-evaluation of the assumptions made regarding historical species compositions between arrowtooth and Kamchatka flounders.*

This will be evaluated during the next full assessment.

*Finally, the SSC suggests that the author explore incorporating aging error into the assessment given the improvements seen in arrowtooth flounder.*

This will be evaluated during the next full assessment.

*the SSC supports the authors’ plans for evaluating formal data weighting, given the fits to the EBS shelf survey, and plans to explore separating age- and length- composition data between the Bering Sea and Aleutian Islands subareas. (SSC, December 2020)*

This will be evaluated during the next full assessment.

*The SSC noted the poor fit to the shelf survey in recent years and flags this for continued investigation. (SSC, December 2020)*

This will be evaluated during the next full assessment.

*With the improvements seen in the Arrowtooth flounder assessment, the SSC continues to support the incorporation of aging error into the assessment. (SSC, December 2020)*

This will be evaluated during the next full assessment.

*The SSC appreciates the re-examination of the age-length transition matrix and looks forward to the evaluation of assumptions about constant or changing CV in the next full assessment. (SSC, December 2020)*

This will be evaluated during the next full assessment.

*Finally, the SSC continues to encourage the examination of the relationship between temperature and catchability. (SSC, December 2020)*

This will be evaluated during the next full assessment.

## **References**

Bryan, M.D., K. Shotwell, S. Zador, J. Ianelli,. 2020. Assessment of the Kamchatka flounder stock in the Bering Sea and Aleutian Islands. In Stock assessment and fishery evaluation document for groundfish resources in the Bering Sea/Aleutian Islands region as projected for 2021. Section 7. North Pacific Fishery Management Council, Anchorage, AK.

## Tables

Table 7.1. Catch in tons, biomass in tons, and the corresponding catch-biomass ratio.

Year	Catch (t)	Total biomass (t)	Catch/biomass
1991	1,951	161,314	0.01
1992	1,190	159,854	0.01
1993	930	158,678	0.01
1994	1,434	157,037	0.01
1995	928	154,188	0.01
1996	1,465	151,370	0.01
1997	1,047	147,970	0.01
1998	1,524	145,093	0.01
1999	1,138	142,085	0.01
2000	1,323	139,496	0.01
2001	1,406	136,931	0.01
2002	1,185	134,999	0.01
2003	1,325	134,693	0.01
2004	1,818	136,828	0.01
2005	1,424	139,584	0.01
2006	1,344	143,565	0.01
2007	1,192	148,024	0.01
2008	7,266	152,443	0.05
2009	12,558	150,306	0.08
2010	20,951	143,463	0.15
2011	10,004	128,288	0.08
2012	9,510	124,851	0.08
2013	7,769	122,180	0.06
2014	6,464	121,882	0.05
2015	4,993	123,524	0.04
2016	4,849	127,525	0.04
2017	4,500	131,819	0.03
2018	3,107	136,687	0.02
2019	4,534	142,176	0.03
2020	7,442	145,368	0.05
2021	6,770	144,671	0.05

## Figures

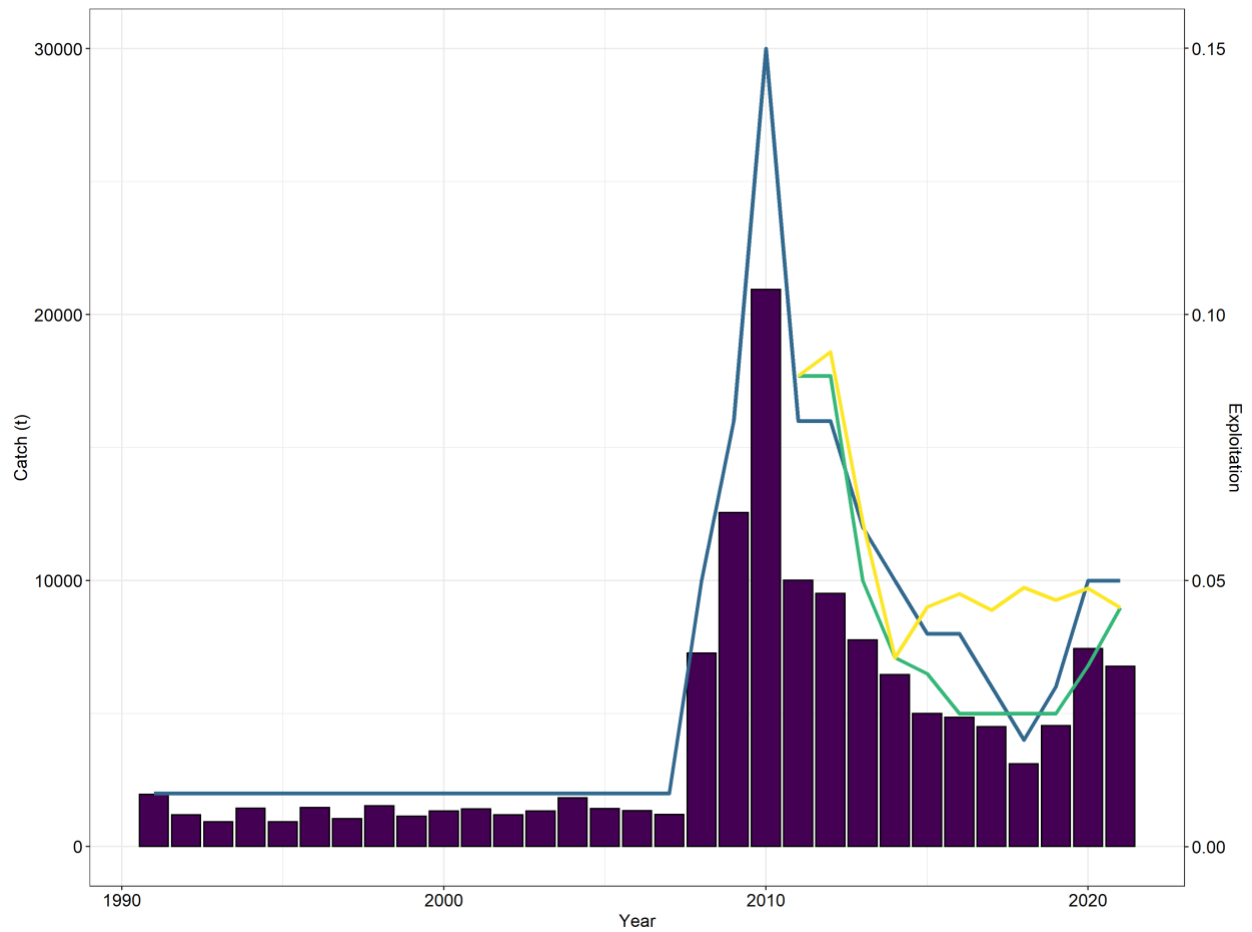


Figure 7.1. Time series of catch in tons (purple bars) and exploitation rate (catch : total biomass, blue solid line), annual specified ABC (yellow line, start year = 2011), and annual specified TAC (green line, start year = 2011).

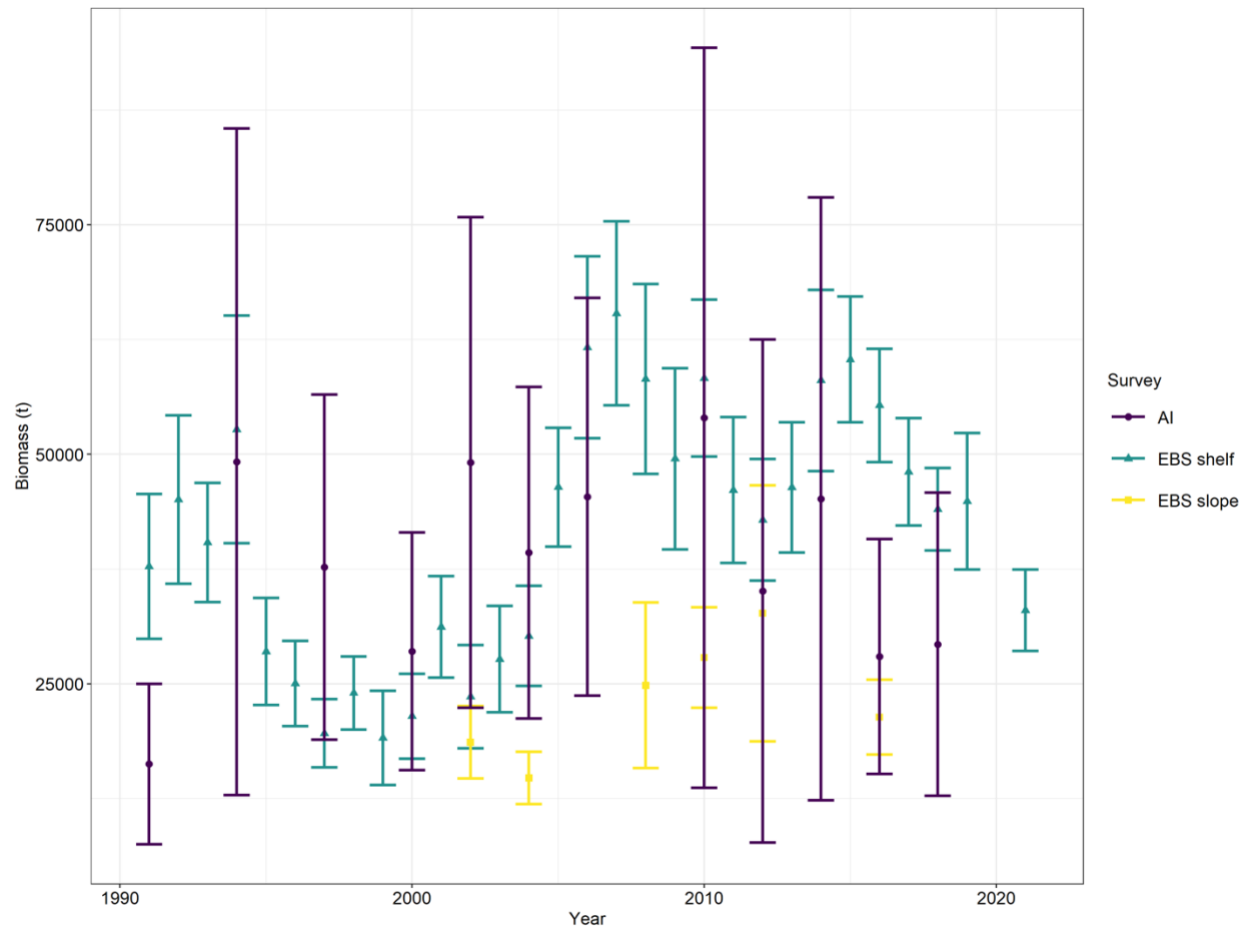


Figure 7.2. Survey biomass estimates from the eastern Bering Sea shelf and slope and the Aleutian Islands.